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Dr. Raymond W. Waldo
Station Manager
San Onofre

June 4, 2004

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Docket Nos. 50-361**
Licensee Event Report No. 2004-002
San Onofre Nuclear Generating Station, Unit 2

Gentlemen:

This submittal provides Licensee Event Report (LER) 2004-002 for a manual trip of SONGS Unit 2 due to a loss of main feedwater.

Any actions listed are intended to ensure continued compliance with existing commitments as discussed in applicable licensing documents; this LER contains no new commitments. If you require any additional information, please so advise.

Sincerely,

Raymond Waldo

LER No. 2004-002

cc: B. S. Mallett, NRC Regional Administrator, Region IV
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 & 3

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NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
San Onofre Nuclear Generation Station (SONGS) Unit 2	05000-361	1 OF 4

4. TITLE

Manual Reactor Trip and Initiation of Auxiliary Feedwater in Response to Loss of Main Feedwater

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									None	
04	10	2004	2004-002-00			06	04	2004	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	1
10. POWER LEVEL	97

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	X 50.73(a)(2)(iv)(A)	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
R. W. Waldo, Station Manager, Nuclear Generation	949-368-8725

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
				N					

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On April 10, 2004, at 1147 PDT, Unit 2 was operating at about 97 percent power when both feedwater pump turbines tripped on high discharge pressure. Plant operators manually tripped the reactor and the auxiliary feedwater system automatically started. SCE reported this event to the NRC in accordance with 10CFR50.72(b)(2)(iv) and 10CFR50.72(b)(3)(iv). This follow-up report is provided in accordance with 10CFR50.73(a)(2)(iv).

The main feedwater pump turbines automatically tripped on high discharge pressure caused by a main feedwater regulating valve and its associated bypass valve closing. SCE concluded the valves began closing due to two concurrent electrical grounds in the feedwater control system (FWCS).

The first ground (Ground 1) was caused by a pinched interconnect wire on one of the two feedwater regulating control systems (FWCS); SCE replaced this wire. SCE was unable to locate the second ground but concluded it was an intermittent ground located in the DC power supply of the FWCS. SCE verified that the valves would begin closing (absent a close signal) when two grounds were present.

SCE determined that the conditional core damage probability (CCDP) and the conditional large early release probability (CLERP) for this event were 2.8E-6 and 1E-7, respectively.

Plant: San Onofre Nuclear Generating Station (SONGS) Unit 2
Event Date: April 10, 2004
Reactor Vendor: Combustion Engineering
Mode: Mode 1 – Power Operation
Power: 97 percent

Description of Event

On April 10, 2004, at 1147 PDT, Unit 2 was operating at about 97 percent power when both main feedwater [SJ] pump [P] turbines (K005/K006) tripped on high feedwater pump discharge pressure. Plant operators (utility, licensed) manually tripped the reactor and the Auxiliary Feedwater System [BA] started automatically.

Plant Operators reported this event to the NRC Operations Center (Log No. 40664) at 1354 PDT in accordance with 10CFR50.72(b)(2)(iv) and 10CFR50.72(b)(3)(iv) for actuation of the Reactor Protection System (RPS) [JC] and the Auxiliary Feedwater system. This follow-up Licensee Event Report is provided in accordance with 10CFR50.73(a)(2)(iv).

Cause of Event

In accordance with their design, both main feedwater pump turbines (K005/K006) tripped on high discharge pressure when main feedwater regulating valve 2FV1111 [FCV] and associated bypass valve 2HV1105 began closing. SCE determined these valves began closing due to two concurrent electrical grounds in the feedwater control system [JB].

The first ground (Ground 1) was caused by a pinched interconnect wire on one of the two feedwater regulating control systems (FWCS). The wire was pinched under the corner of a horizontal terminal strip and has most likely been pinched since initial plant startup. SCE concluded that the insulation just recently separated at the pinch point exposing the copper conductors, and shorting to ground when it contacted the mounting rail.

SCE was unable to locate the second ground (Ground 2) but concluded it was an intermittent ground located in the FWCS (an ungrounded system). SCE verified that 2FV1111 and 2HV1105 would begin closing (absent a close signal) when Ground 1 was present and the FWCS power supply common was grounded. That is, a single ground by itself, either the pinched wire or a ground in the power supply, would not cause the valves to begin closing. Ground 2 cleared before it could be located.

Corrective Actions

1. The damaged wire (Ground 1) was replaced. The system was retested and returned to service.

2. SCE examined both FWCS cabinets and did not locate any other wiring near terminal blocks that might be crimped or grounded.

3. SCE also inspected and tested accessible electrical wires and components in the FWCS, particularly those closer to metal surfaces, to locate Ground 2. Ground 2 cleared before it was located. (Note, however, that because two grounds must be present to cause 2FV1111 and 2HV1105 to close when a close signal is not present, repair of Ground 1 will preclude a similar occurrence).

4. For other critical control systems with floating power supplies, SCE will review and revise applicable maintenance and test procedures for plant personnel to test for power supply grounds.

5. SCE is planning to replace the current analog feedwater control system with a fault tolerant digital control system. The digital FWCS will reduce the vulnerability for single failure.

Safety Significance

An assessment of the conditional core damage probability (CCDP) and the conditional large early release probability (CLERP) for the April 10, 2004 event determined that the Unit 2 CCDP and CLERP were 2.8E-6 and 1E-7, respectively. The assessment was based on the reported actual component unavailability, system alignments and operating conditions that existed at the time of the event.

The Main Feedwater pumps are not essential for safe shutdown of the plant. The SONGS 2/3 UFSAR, Sections 15.2.2.5 and 15.10.2.2.5, credits the AFW system for maintaining an adequate heatsink during a transient in which an instantaneous and complete loss of feedwater occurs. The event reported herein, where main feedwater was lost and all safety systems functioned correctly is bounded by the UFSAR safety analysis identified above.

Additional Information

SCE has reported two recent events involving the FWCS:

LER 1999-003-00: On November 21, 1999, with the Unit 3 reactor at 97 percent power, main feedwater controller card 3FC1121 failed due to a manufacturing defect (pinhole oxide defect) in an operational amplifier. This controller card had been in service for many years and when it failed, it failed at the location of the manufacturing defect. Corrective actions for the November 21, 1999 event focused on cards with Fairchild operational amplifiers.

LER 2002-006-00: On November 2, 2002, with the Unit 2 reactor at 100 percent power, 2FC1111 main feedwater controller card had a shorted low limit operational amplifier. This was believed to be an age-related failure. Corrective actions for this event focused on the replacement of Unit 2 main feedwater controller cards with new cards. Corresponding cards in Unit 3 were also proactively replaced.

As noted, corrective actions that have been completed for these two prior events focused on replacement of the failed controller cards. SCE concludes the two grounds reported herein were not present concurrently when the previous repairs were completed. Therefore, previous completed corrective actions could not have prevented this event.